TARDEC

Tank-Automotive Research, Development and Engineering Center

Assured Mobility Simulator

Given by:

Keith Kamysiak
KamysiaK@tacom.army.mil
586-574-6386

03/08/04

12121

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
08 MAR 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Assured Mobility Simulator	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Kamysiak,Keith	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000	**16121**
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	TACOM/TARDEC
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)
	16121

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

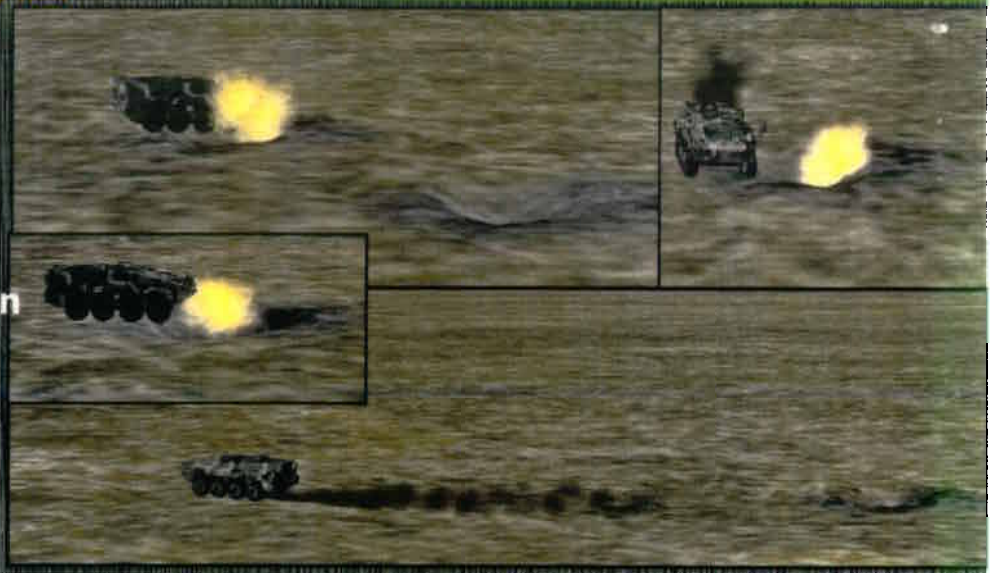
15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**5**	

Assured Mobility Simulator

UNCLASSIFIED

- The Assured Mobility Simulator (formerly the Full Spectrum Route Clearance Simulator) is a high resolution, real time simulation environment used to simulate the SABRE system in various mission scenarios for engineering and training purposes
- The simulator provides both visual and haptic (motion based) simulation of the SABRE system.
- The Full Spectrum Route Clearance Simulator (FSRC Sim) was developed as an update to an existing Simulator, the Grizzly Engineering and Training Simulator (GETS)



Existing Trailer was re-used to provide a mobile platform for the simulator

- ***Previous GETS System***
  - The GETS Mobile Simulator was built specifically for the Grizzly Program was cut of funding at the termination of the Grizzly Program
  - A Functional Trailer with a full motion base was completed, and a partial virtua environment was created on the remaining budget
  - The system utilized an outdated, proprietary hardware system based on a Silicon Graphics Onyx2 Image Generation Server
  - The unfinished simulation environment provided little to no mission specific engineering or tactical feedback.
  - Mine blast simulation was not completed due to the termination of the project, leaving the virtual environment with a total lack of threats.
  - Problematic Hardware caused a severe reduction in uptime. Common errors included flashing display screen, total loss of vehicle control, and the disabling of motion based simulation due to overextension of the motion base actuators.
  - An incomplete Dynamic Terrain algorithm produced tessellation errors, causing jagged breaks in the ground plane, and allowed the vehicle to often fall through the ground plane, terminating the simulation.

Assured Mobility Simulator

UNCLASSIFIED

Vehicle Model and Menu System Capabilities

On-Route SABRE Model

- ***The SABRE On-Route***
  - Tele-operation of the mobility, action, and camera controls
  - Simulation of an AT mine roller
  - Autonomous Lead Follow Capability
  - Ability to clear urban rubble objects by pushing with the vehicle body.

Off-Route SABRE

- ***The Mine Detection Robot***
  - Tele-operation of the mobility, action, and camera controls
  - Mine detection and marking capability through a virtual paint system
  - Autonomous Lead Follow Capability

- ***The SABRE Off-Route***

(in addition to the capabilities of the On Route System)

- Ability to deploy FWMCB to plow terrain with a rudimentary plowed lane 2D visual effect.

Stryker Model

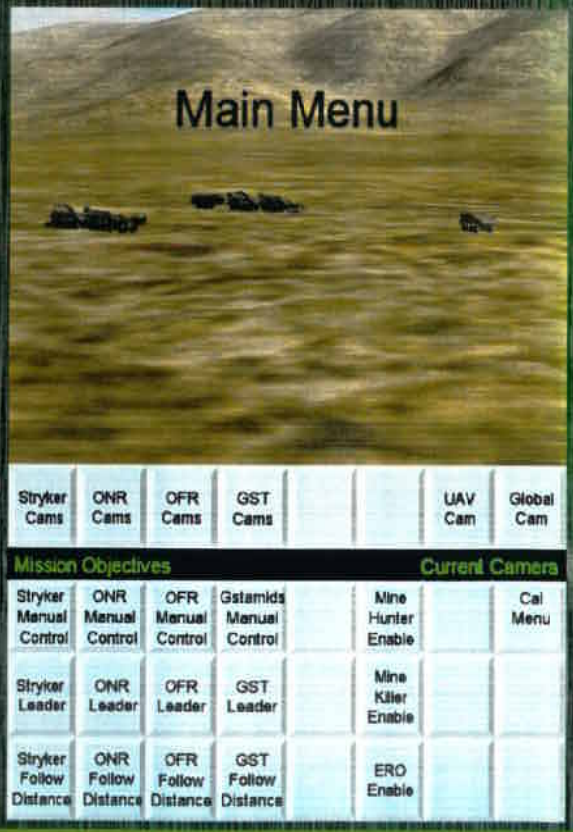
Mine Detection Robot

- ***The Stryker Vehicle***
  - Autonomous Lead Follow Capability
  - Capability to display a simulated UAV viewpoint
  - Capability to display a simulated real time updated mission map
  - Haptically rendered vehicle dynamics

Menu System

Provides symbology overlay content to monitor and control the following:

- Selection of vehicle to be controlled or monitored at each crew input station
- Selected vehicle movements
- individual vehicle camera selection and position
- Robotic mine detection and marking functionality
- SABRE FWMCB.

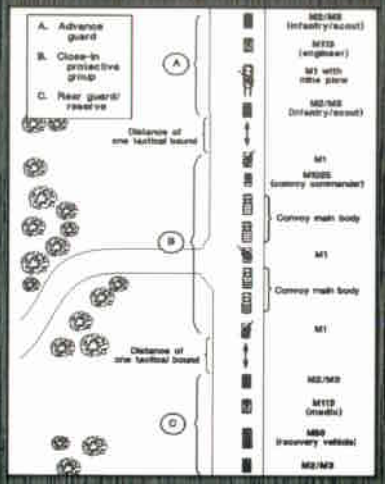


UNCLASSIFIED

Assured Mobility Simulator

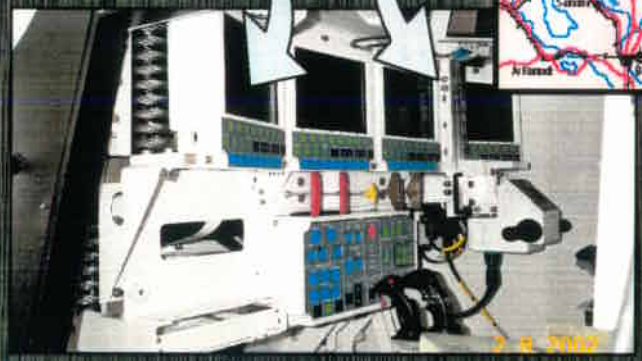
UNCLASSIFIED

TRADOC Vignettes



-TO M S
A Mobile, Motion-Based Simulator

Environment Data



Threat Characteristics

Vehicle Platform Models

Future Improvements to Simulation Environment

- Movement to CMCB-TOPS, an IED focused simulator used to quickly react to new IED threats and tactics by allowing a rapid of new TTPs in response to these emerging threats
- Inclusion of IED simulation with command detonated option controlled by secondary system operator
- Inclusion of Live Fire simulation capability
- Improved Urban Terrain Mission Scenarios
- Development of Dynamic Terrain for mine blast, IED detonation, mine clearing, and plowing simulation with realistic reaction of ground surface
- Inclusion of Vehicle Component FEA analysis data for use in vehicle dynamics simulation including reaction to mine blast
- Ability to easily extract meaningful engineering data (Component Forces, Vehicle Component Load experienced, Vehicle Component Stresses, Failure Modes, Etc.) in real time

UNCLASSIFIED

Live Demonstration

The PC on the Table is running the current version of the FSRC Simulation Program for public use.

The on-screen menu system is usable through the touch-screen interface.

From the Main Screen, choose a vehicle to manually control.

Using the onscreen menu, release the parking brake, start the engine, and place the transmission in drive.

The joystick can then be used to control the throttle and steering of the vehicle. Camera position on the vehicle can be changed using the blue buttons.

The white markers represent the location of buried landmines. The application is currently set to allow you to drive over mines detonating them, without causing permanent damage to the vehicle